PEACE/WILLISTON
FISH & WILDLIFE
COMPENSATION
PROGRAM

BC hydro

BRITISH
COLUMBIA

A Reconnaissance Survey Of Middle Tenakihi Lake

M. J. Hunter
March 1997

PWFWCP Report No. 166

105-02067/

The Peace/Williston Fish & Wildlife Compensation Program is a cooperative venture of BC Hydro and the provincial fish and wildlife management agencies, supported by funding from BC Hydro. The Program was established to enhance and protect fish and wildlife resources affected by the construction of the W.A.C. Bennett and Peace Canyon dams on the Peace River, and the subsequent creation of the Williston and Dinosaur Reservoirs.

Peace/Williston Fish and Wildlife Compensation Program, 1011 Fourth Ave. 3rd Floor, Prince George B.C. V2L 3H9

Website: *www.bchydro.bc.ca/environment/initiatives/pwcp/*

This report has been approved by the Peace/Williston Fish and Wildlife Compensation Program Fish Technical Committee.

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A RECONNAISSANCE SURVEY OF

MIDDLE TENAKIHI LAKE

WATERSHED:	**Williston Reservoir (Finlay Reach)**
DATE OF SURVEY:	**September 26 - 27,1996**
FIELD CREW LEADER:	**Mark Hunter**
FIELD ASSISTANT:	**Karin Mathias**
REPORT PREPARED BY:	**Mark Hunter**

BRITISH COLUMBIA CONSERVATION FOUNDATION

PEACE / WILLISTON FISH AND WILDLIFE COMPENSATION PROGRAM

B. C. MINISTRY OF ENVIRONMENT, LANDS AND PARKS

FUNDED BY: FOREST RENEWAL BRITISH COLUMBIA

RELEASED BY: _____

D. J. Cadden, Regional Fisheries Biologist

LAKE: Middle Tenakihi Lake **SYSTEM NAME: Osilinka River**

A.S.A.P. REFERENCE NO.: **SYSTEM NO.: 238-0240-403**

DATA ON FILE FOR THIS SURVEY

Location	X	Dissolved 02 / Temp. Profiles	X
Physical Data	X	Winter Dissolved 02 / Temp. Profiles	--
Bench Mark	X	Netting Record	X
Terrain Features	X	Lake Catch Summary	X
Access	X	Individual Fish Data	--
Resorts and Campsites	X	Fish Preserved	--
Other Developments	X	Stomach Analysis	--
Obstructions and Pollutions	X	Scale Reading	--
Special Restrictions	X	Location of Inventory Sites	X
Aquatic Plants	X	Photograph Directory	X
Wildlife Observations	X	Appendices	
Miscellaneous Comments	X	A: Water Chemistry Analysis	X
Lake Drainage	X	B: Tributary Stream Data	X
Fisheries Management Comments	X	C: Fish Scale Analysis	--
History of Previous Surveys	X	Bathymetric Map Reduction	X
Water Chemistry Summary	X	Bathymetric Map	--

LOCATION

Location:	approximately 176 northwest of Mackenzie		
Elevation:	1210 m ± 10 m	U.T.M.:	10.349154.6230392
Latitude / Longitude:	56°11'40" 125°25'52"	N.T.S. Map No.:	94 - C / 8
Management Unit:	7-38	Biogeoclimatic Zone:	Boreal White & Black Spruce
Ecoprovince:	Sub-Boreal Interior	Ecoregion:	Omineca Mountains
Ecosection:	Southern Omineca Mountains		

Drainage: Tenakihi C. --> Lower Tenakihi L. --> Tenakihi C. --> Osilinka R. --> Williston Reservoir (Osilinka Arm - Finlay Reach) --> Peace R.

PHYSICAL DATA

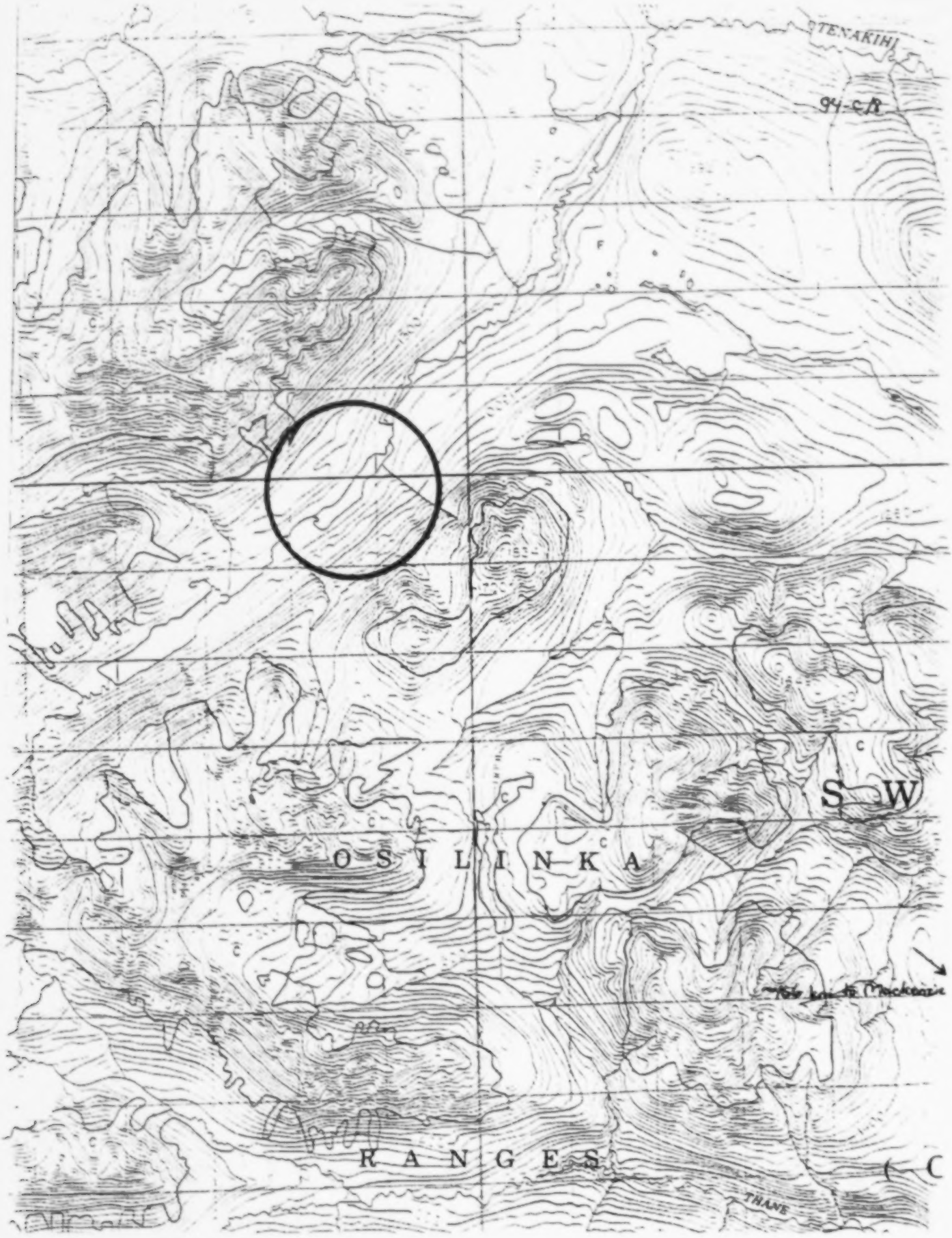
Lake Drainage Area:	53.1 km^2	Volume:	371447 m^3
Water Surface Area:	163 291 m^2	Perimeter of Islands:	0 m
Area Above 6 m Contour:	157 104 m^2	Number of Islands:	0
Shoreline Perimeter:	3 202 m	Mean Depth:	2.4 m
Maximum Depth:	7.3 m	Secchi Reading:	7.3 m
Filterable Residue (TDS):	60 mg/L		

Sounding Device: Lowrance X-15 Elevation Source: Contour Interpolation

BENCHMARK

(Iron spike, center of red circle) located 2.0 m above present water level in a 21 cm diameter lodgepole pine tree that is 4.6 m from the present water's edge and located on the north end of the lake approximately 100 m from the outlet (Plate # 5).

High Water Mark: 0.2 m above water level at time of survey


TENAKIHI
94-C/R
S W
O S I L I N K A
156 km to Mackenzie
R A N G E S
THANE

LAKE: Middle Tenakihi Lake

TERRAIN FEATURES

Immediate Shoreline:

From the north side of Middle Tenakihi Lake clockwise around to the middle of the southeast side, the lake is fronted by a gravel and cobble beach with spruce trees, willows, scrub birch and grasses growing behind on low slopes. Along the north side of the lake there is also some lodgepole pine trees growing behind the beach. Along this part of the lake, the shoreline substrate is composed of gravels and cobbles with boulders in some locations overlaid by fines. There is a shoal found off a point of land on the north side of the lake.

The lake is fronted by spruce trees, willows, scrub birch and grasses growing on low slopes along the remainder of the lake. Lodgepole pine trees also grow on the southwest,, west and northwest sides of Middle Tenakihi Lake. The shoreline substrate is composed of fines with some boulders along this part of the lake. The exception in this end of the lake is found directly in front of the main inlet (Tenakihi Creek), where the shoreline substrate is gravels.

From the water's edge, the shoreline has a moderate slope towards the middle of the lake along the northeast, northwest and southeast sides of Middle Tenakihi Lake. Along the southwest end of the lake, the lake's bottom has a low slope towards the center of the lake. There is some large woody debris found along the shore of the lake around the entire lake. There are also two beaver huts located on the lake - one on the east side of the lake and one on the southwest side of the lake.

Surrounding Country:

Middle Tenakihi Lake is surrounded by a mature forest of spruce trees with some lodgepole pine and paper birch trees intermixed with the spruce trees; the lodgepole pine and paper birch trees are located mainly northwest of the lake. To the northwest and southeast of the lake, the low slopes give way immediately to steeper slopes that rise up to form craggy mountains. To the northeast and southwest, the land remains relatively flat with mountains in the far distance. Middle Tenakihi Lake is situated within the Boreal White and Black Spruce biogeoclimatic zone.

LAKE: Middle Tenakihi Lake

ACCESS

Directions:

From it's junction with Highway 39, drive south on Highway 97 for approximately 1.5 km, and turn right on to the Finlay Forest Service Road. Travel north for approximately 173 km, then turn left on to the Osilinka Forest Service Road. Proceed for approximately 46.5 km to Osilinka Camp. The total distance from the junction of Highway 97 and Highway 39, the total distance to Osilinka Camp is approximately 221 km. Middle Tenakihi Lake is approximately an 18 km helicopter ride west-northwest of Osilinka Camp.

Road Type and Conditions:

Highway 97 is a well-maintained, two-lane paved provincial highway. The Finlay Forest Road and the Osilinka Forest Service Road are both well-maintained, two-lane gravel logging roads that are easily traveled with a two-wheel drive vehicle during the summer.

Restrictions:

Although there are no restrictions, it is recommended that a truck radio be used when traveling on the gravel roads.

RESORTS AND CAMPSITES

There are no resorts or campsites located on Middle Tenakihi Lake.

OTHER DEVELOPMENTS

There was a cabin built approximately 600 m upstream of Middle Tenakihi Lake on Tenakihi Creek. It appeared that the cabin was used by a trapper - there were traps and horse tack in the cabin.

OBSTRUCTIONS AND POLLUTIONS

None noted.

LAKE: Middle Tenakihi Lake

SPECIAL RESTRICTIONS

None known.

AQUATIC PLANTS

The following aquatic plants were identified during the time of the survey:

eel grass

WILDLIFE OBSERVATIONS

The following wildlife or signs were identified during the time of the survey:

3 moose
5 unidentified ducks
muskrat
gray jay & other various songbirds

MISCELLANEOUS COMMENTS

1) The aquatic vegetation in Middle Tenakihi Lake is very sparse.

2) The shoal found off the point of land on the north side of Middle Tenakihi Lake is very shallow and could be hazardous to boaters.

3) The point of land on the north side of Middle Tenakihi Lake is a good location for a Forest Recreation Site, as is the northeast end of the lake.

4) Bathymetric map: The lake outline was drawn from an enlargement of air photo 30 BCB 93025: No. 068, flown August 5, 1993.

LAKE: Middle Tenakihi Lake

LAKE DRAINAGE

General:

Middle Tenakihi Lake is fed by two inlets, one of which is Tenakihi Creek, and an additional 14 small, intermittent inlets. The lake is drained to the northeast by Tenakihi Creek which flows for approximately 2.6 km to a small unnamed lake. This lake is drained by a continuation of Tenakihi Creek, which flows for approximately 2 km Lower Tenakihi Lake. Tenakihi Creek continues downstream of this lake for approximately 26 km to it's confluence with the Osilinka River.

Major Systems:

Inlet # 1 - Tenakihi Creek

Inlet # 1 (Tenakihi Creek) enters Middle Tenakihi Lake in the west corner of the lake (Plate # 6). Over the first 15 m upstream of the lake, the channel is braided. Approximately 15 m upstream of the lake, the braids converge to form one channel. From 15 m to 150 m upstream of Middle Tenakihi Lake, the creek has an average wetted width of 13.0 m and depth of 0.3 m. The substrate is composed of gravels, small cobble, fines and large cobble, with some large woody debris fallen into the channel. From 150 m to 280 m upstream of the lake, the substrate changes to contain more small cobble and less gravels - this is mainly large gravels. From 280 m to 430 m upstream of the lake, the channel narrows to an average wetted width of 8.0 m with an average depth of 0.3 m. There are some pools located along this section of the creek that are deeper than 1.0 m. From 430 m to 540 m upstream of Middle Tenakihi Lake, the channel widens to an average wetted width of 12.0 m and an average depth of 0.7 m. The substrate is composed mainly of fines (70%) with some gravels, cobbles and boulders. The flow has decreased, and the channel is braided around a few islands of sedge grasses as well. Up to this point, the creek is held by banks of fines, gravels and small cobble covered with mosses, grasses, willows, scrub birch and some spruce trees. From 540 m to 700 m upstream of the lake, the channel narrows down again to an average wetted width of 8.0 m and depth of 0.35 m. The substrate is mainly gravels, with some fines, cobbles and boulders. Also, there is some green algae growing in the creek at this point. The banks up to this point are composed of fines, gravels and cobbles covered by mosses, grasses, willows, scrub birch and some spruce trees. Approximately 730 m upstream of the lake, the left bank (looking upstream) becomes steep and is 20 m high. The right bank remains as before. From 700 to 1100 m upstream of the lake, the creek has an average wetted width of 14.5 m and depth of 0.3 m. The substrate is very similar to the prior section, but there is more green algae growing in the creek. The left bank slowly decreases in size over the last 100 m to the same height as the right bank. Approximately 1100 m upstream of Middle Tenakihi Lake, Tenakihi Creek drains Upper Tenakihi Lake.

LAKE: Middle Tenakihi Lake

A Stream Survey Card was completed for a sample site located approximately 175 m upstream of Middle Tenakihi Lake (Plate # 7). The average wetted width is 19.5 m and the average maximum riffle depth is 0.3 m. The substrate is composed of gravels (55%), cobbles (35%) and fines (10%). The creek morphology is mainly runs (55%) and riffles (40%) with a gradient of 1.5%. The water temperature at the time of the survey was 7 °C. For additional information, refer to Appendix B.

A Stream Survey card was completed for a second sample site located approximately 900 m upstream of Middle Tenakihi Lake (Plate # 8 & # 9). The average wetted width is 14.5 m and the average maximum riffle depth is 0.3 m. The substrate is composed of gravels (60%), fines (20%), cobbles (15%) and boulders (5%) with green algae growing on the bottom of the creek. The creek morphology is riffles and runs (50% each) with a gradient of 1.5%. The water temperature at the time of the survey was 10 °C. For additional information, refer to Appendix B.

Approximately 300 m upstream of Middle Tenakihi Lake, there is an inlet to Tenakihi Creek that enters on the left hand side (looking upstream). This creek has an average wetted width of 1.8 m and depth of 0.1 m. The substrate is composed of cobbles (60%), gravels (30%) and fines (10%). The water temperature at the time of the survey was 4 °C.

Outlet - Tenakihi Creek

The outlet drains Middle Tenakihi Lake from the northeast end of the lake (Plate # 10). Over the first 175 m downstream of the lake, the creek has an average wetted width of 9.0 m and depth of 0.4 m. The substrate is composed of cobbles, gravels and boulders. There is some instream moss-like vegetation. From 175 m to 240 m downstream of the lake, the channel widens. The average wetted width is 15 m and there are some deep pools (1.3 m). The substrate is composed of gravels, cobbles and boulders. Approximately 240 m downstream of the lake, there is a side pond that is approximately 60 m wide and 50 m long, and approximately 1.75 m deep. The substrate in the side pond is composed of fines and organics over gravel, with some cobbles on the sides. From 260 m to 320 m downstream of Middle Tenakihi Lake, the average wetted width is 20 m and the average depth is 1.0 m. The substrate is composed of organics over clay with some gravels, cobbles and boulders. From 320 m to 380 m downstream of the lake, the average wetted width is 10.0 m and the average depth is 0.35 m. There are some pools that have a depth of 0.65 m. The substrate is composed of cobbles, boulders and gravels. Up to this point, the creek is held by banks of fines, gravels and cobbles covered by mosses, grasses and scrub birch. As well, there is some spruce trees growing on the banks, mainly on the Middle section of the creek. Downstream of 380 m from Middle Tenakihi Lake, the creek flows through a steep banked channel, with bedrock faces on the outside bends of the creek. There are occasional chutes and cascades seen as well. The substrate is composed of boulders (65%), cobbles (20%), gravels (5%) and fines (10%). The average wetted width is 7.0 m. The average riffle depth is 0.5 m and there are some pools that are approximately 2.0 m deep.

LAKE: Middle Tenakihi Lake

A Stream Survey Card was completed for a sample site located approximately 120 m downstream of Middle Tenakihi Lake. The average wetted width is 9.5 m and the average maximum riffle depth is 0.4 m. The substrate is composed of cobbles (50%), gravels (20%), boulders (20%), and fines (10%). The creek morphology is mainly riffles (60%) with some runs (20%) and small cascades (20%), and a gradient of 3%. The water temperature at the time of the survey was 7 °C. For additional information, refer to Appendix B.

Approximately 210 m downstream of Middle Tenakihi Lake, two small inlets enter Tenakihi Creek from the right (looking upstream). These inlets have an average wetted width of 0.15 and 0.5 m respectively, with an average depth of 0.05 m for both. The substrate in each inlet is composed of fines with some cobbles. These two inlets drain a beaver pond, 10 m by 20 m, that is located approximately 3 m upstream of Tenakihi Creek. This inlet had no fisheries potential during the survey period.

Approximately 250 m downstream of Middle Tenakihi Lake, a second inlet enters Tenakihi Creek on the right side (looking upstream). This inlet has an average wetted width of 0.2 m and depth of 0.05 m. The substrate is composed of fines and small gravels. This inlet had no fisheries potential during the survey period.

Approximately 345 m downstream of Middle Tenakihi Lake, a third inlet enters Tenakihi Creek. This inlet has an average wetted width of 0.25 m and depth of 0.15 m. The substrate is composed of gravels, cobbles and fines with some boulders. The creek alternates between cascades and runs, and had a gradient of 8.5 %. This inlet had no fisheries potential during the survey period.

Minor Systems

Inlet # 2 - Unnamed Creek

Inlet # 2 enters Middle Tenakihi Lake in the north corner of the lake. Over the first 6 m upstream of the lake, the average depth is only 0.03 m. From 6 m to 25 m upstream of the lake, the creek has an average wetted width of 0.8 m and depth of 0.1 m. The substrate is composed of gravels, small cobble and fines with a low compaction. The banks are 0.25 m high and covered by mosses with willows, scrub birch and spruce trees growing on them. Upstream of 25 m, the gradient increases and small cascades are present. The channel braids often, and lots of large woody debris has fallen into the channel. The water temperature at the time of the survey was 5 °C. Inlet # 2 had no fisheries potential during the survey period.

LAKE: Middle Tenakihi Lake

Intermittent Inlets # 1 - # 14 - Unnamed Creeks

The intermittent inlets that drain into Middle Tenakihi Lake are all very similar. The average wetted width varies between 0.2 m to 0.3 m, and the average depth varies between 0.05 m to 0.1 m. The substrate in each is composed of varying amounts of fines and gravels. All of the intermittent inlets go underground at some point close to the lake (maximum distance is approximately 50 m upstream of the lake). The intermittent inlets had no fisheries potential during the survey period.

LAKE: Middle Tenakihi Lake

FISHERIES MANAGEMENT COMMENTS

Middle Tenakihi Lake appeared to be barren of all fish species. No fish were caught in four Gee minnow traps and one experimental monofilament gill net set overnight. There did appear to be a good food base in the lake, consisting of caddis fly larvae and other aquatic organisms. As well, there was good to excellent spawning habitat found in Tenakihi Creek both upstream and downstream of the lake. The lake is 7.3 m deep and the summer oxygen / temperature profile shows excellent levels of dissolved oxygen throughout the water column - the reason for this may be that the lake had just turned over. The pH averaged 7.45 (field) from top to bottom, which is also suitable for the survival of salmonids. Middle Tenakihi Lake is a prime candidate for a stocking program. Because this lake appears to be barren of all fish species, as is the lake immediately upstream, this could be an excellent system to be stocked with an Arctic grayling population as there would be no aquatic predators. If Arctic grayling were used, they could be caught in either the Osilinka or Mesilinka Watersheds to prevent the introduction of a new stock of Arctic grayling into the Osilinka River if any fish did move downstream. There is a trappers / guide outfitters cabin located approximately 600 m upstream of Middle Tenakihi Lake - if the lake was stocked with Arctic grayling, the owner of the cabin may be notified at the discretion of the stocking agency so as to prevent the owner from fishing in the lake. There is a good location for a Forest Recreation Site located either on the point of land on the north side of the lake or in the northeast end of the lake. Middle Tenakihi Lake is situated within a valley between mountains, which makes the lake and surrounding country very pleasing to the eye. A large set of falls, approximately 10 m maximum in height, is located approximately 6 km to 7 km downstream of Middle Tenakihi Lake. These falls are probably the reason why the lake is barren.

HISTORY OF PREVIOUS SURVEYS

Lake Surveys:

None known.

Other Related Studies:

None known.

LAKE: Middle Tenakihi Lake

WATER CHEMISTRY SUMMARY Limnology Station No. 1

Field Conditions:

Date:	September 27, 1996		
Time:	1130 hrs	Air Temperature:	8.0 °C
Wind Velocity:	5 - 8 km/h	Wind Direction:	from the NE
Cloud Cover:	10 / 10o.c.	Surface Conditions:	rippled
Secchi Disc:	7.3 m	Water Colour:	clear with green tinge

Method Used:

Dissolved Oxygen:	YSI Model 57 Oxygen / Temperature Meter
Water Temperature:	YSI Model 57 Oxygen / Temperature Meter
Air Temperature:	Hand-Held Alcohol Thermometer
pH (field):	Digital pH Pocket Tester
H2S (field):	Hach H_2S Field Test Kit
Laboratory Used:	Pacific Environmental Science Center
Water Sampler:	Vertical Alpha Water Bottle (Vandorn)
Metal Sampler:	By Hand; Preserved With 2.0 mL Nitric Acid
Substrate Sampler:	Substrate Sample Not Taken

Water Sample Chemistry: **SEAM Site No.:**

	Sampling Depths	
	Surface (0.5 m)	Lower (6.5 m)
Alkalinity (lab)	23.5 mg / L	26.7 mg / L
Filterable Residue 105°C (lab)	60 mg / L	30 mg / L
H2S (field)	N/A	0.0 mg / L
Nitrogen - Total (lab)	0.03 mg / L	0.03 mg / L
Non-Filterable Residue (lab)	< 5 mg / L	< 5 mg / L
pH (field)	7.5	7.4
pH (lab)	7.56	7.56
Phosphorus - Total Dissolved (lab)	< 0.002 mg / L	0.006 mg / L
Specific Conductance (lab)	60 µS / cm	62 µS / cm

Bottom Depth: 7.3 m

Substrate Sample Depth: N/A

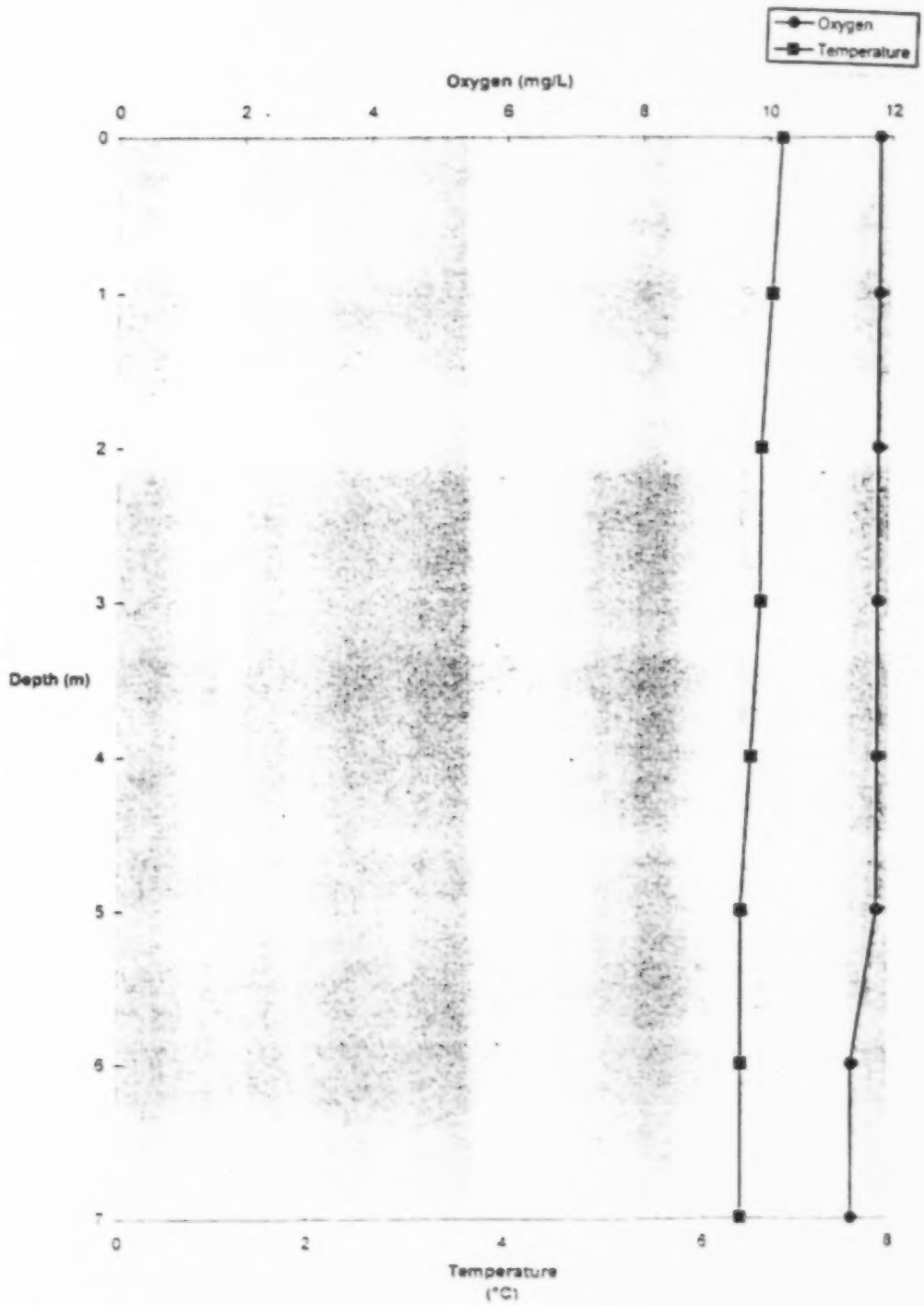
* additional analyzed parameters and results, including metals, are found in Appendix 1

LAKE: Middle Tenakihi Lake

SUMMER OXYGEN / TEMPERATURE DATA

DEPTH (m)	02 (mg/L)	TEMPERATURE (°C)
Surface	11.8	6.8
1.0	11.8	6.7
2.0	11.8	6.6
3.0	11.8	6.6
4.0	11.8	6.5
5.0	11.8	6.4
6.0	11.4	6.4
7.0	11.4	6.4
7.3	Bottom	

SUMMER OXYGEN / TEMPERATURE PROFILE



LAKE: Middle Tenakihi Lake

NETTING RECORD

Mesh Size Experimental Order: 25, 76, 51, 89, 38, 64 mm

NETTING SITE # 1

Type:	Sinking Monofilament Gill Net			
Date Set:	September 26, 1996		Time:	1737 hrs
Date Lifted:	September 27, 1996		Time:	0805 hrs
Net Dimensions:	Length:	91.4 m	Depth:	2.4 m
Shallow End Mesh Size:	25 mm		Depth:	0.04 m
			Substrate:	thin layer of silts over fines, gravels and cobbles
Deep End Mesh Size:	64 mm		Depth:	5.5 m
			Substrate:	silts over bedrock

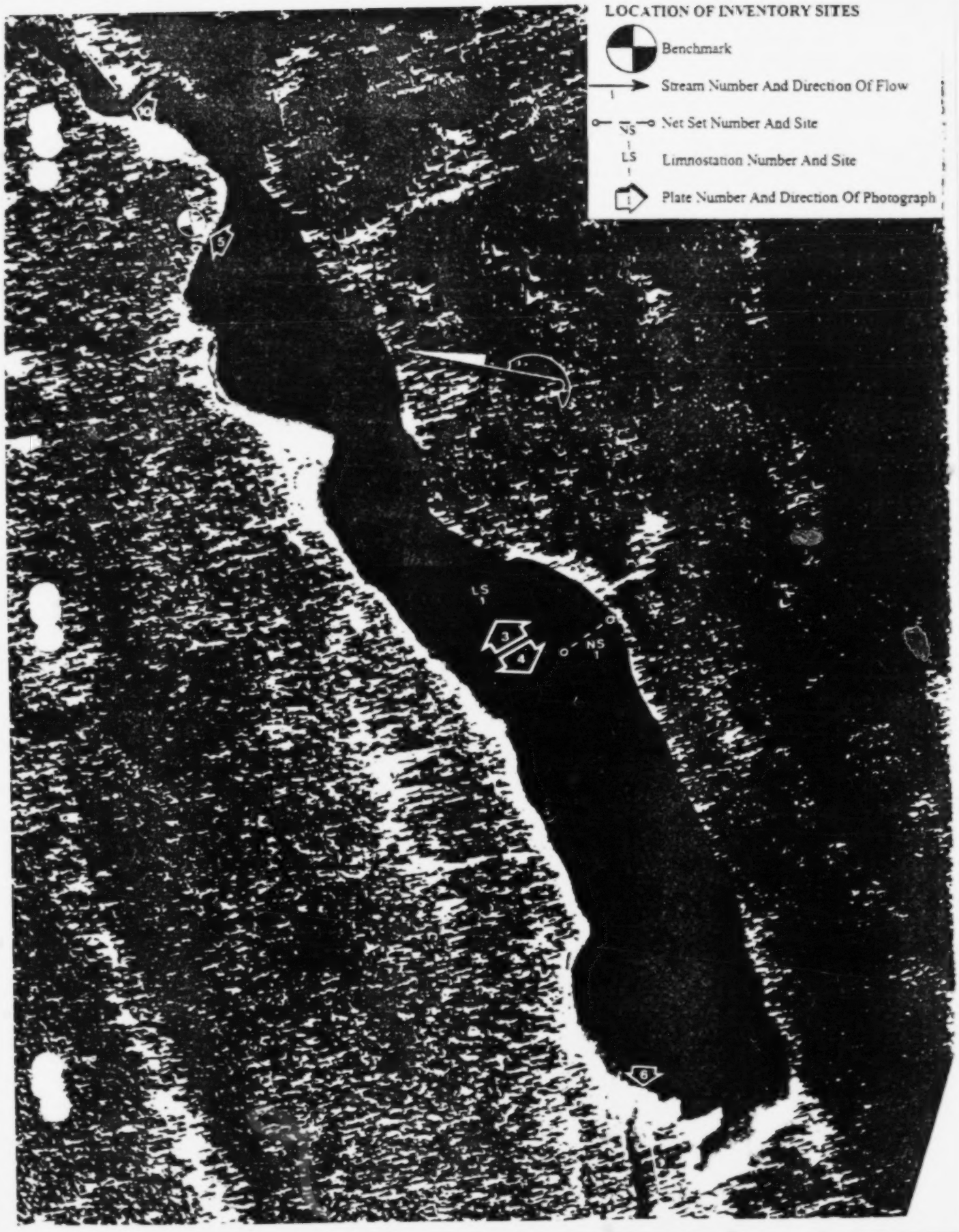
Comments: The net started approximately 5.5 m from the shore. The net was empty.

LAKE CATCH SUMMARY

Minnow Traps:

Bait: Sardines

Trap No.	Hours	Depth (m)	Substrate	Species	No. Caught	Size Range (cm)
1	14:08	0.9	silt over cobble and boulder	empty	0	-
2	14:07	1.2	silts / organics over gravel	empty	0	-
3	14:02	1.2	silts / organics over fines	empty	0	-
4	14:02	0.8	fines and gravels	empty	0	-


LOCATION OF INVENTORY SITES
Benchmark
Stream Number And Direction Of Flow
Net Set Number And Site
Limnostation Number And Site
Plate Number And Direction Of Photograph
LS
NS
3
4
5
6

LAKE: Middle Tenakihi Lake

PHOTOGRAPH DIRECTORY

Plate	Roll : Number	Description
1	31: 19	Aerial view of Middle Tenakihi Lake looking northeast. Note Tenakihi Creek (Inlet # 1) in the foreground to the left.
2	31: 17	Aerial view of Middle Tenakihi Lake looking southwest. Note Tenakihi Creek (Outlet) in the foreground.
3	34: 20 - 22	Panoramic view of Middle Tenakihi Lake looking northeast from the center of the lake.
4	34: 17 - 19	Panoramic view of Middle Tenakihi Lake looking southwest from the center of the lake.
5	34: 16	View of the benchmark located 2.0 m above present water level in a 21 cm diameter lodgepole pine tree that is 4.6 m from the present water's edge and located on the north end of the lake approximately 100 m from the outlet.
6	34: 14	View of the mouth of Tenakihi Creek (Inlet # 1) where it enters Middle Tenakihi Lake in the west corner of the lake.
7	34: 23	Downstream view of sample site # 1 on Tenakihi Creek (Inlet # 1), taken approximately 190 m upstream of Middle Tenakihi Lake.
8	32: 12	Upstream view of sample site # 2 on Tenakihi Creek (Inlet # 1), taken approximately 785 m upstream of Unnamed Lake (Tenakihi Lake Southwest).
9	32: 13	Downstream view of sample site # 2 on Tenakihi Creek (Inlet # 1), taken approximately 815 m downstream of Unnamed Lake (Tenakihi Lake Southwest).
10	34: 15	View of the mouth of Tenakihi Creek (Outlet) where it drains Middle Tenakihi Lake from the northeast end of the lake.

LAKE: Middle Tenakihi Lake

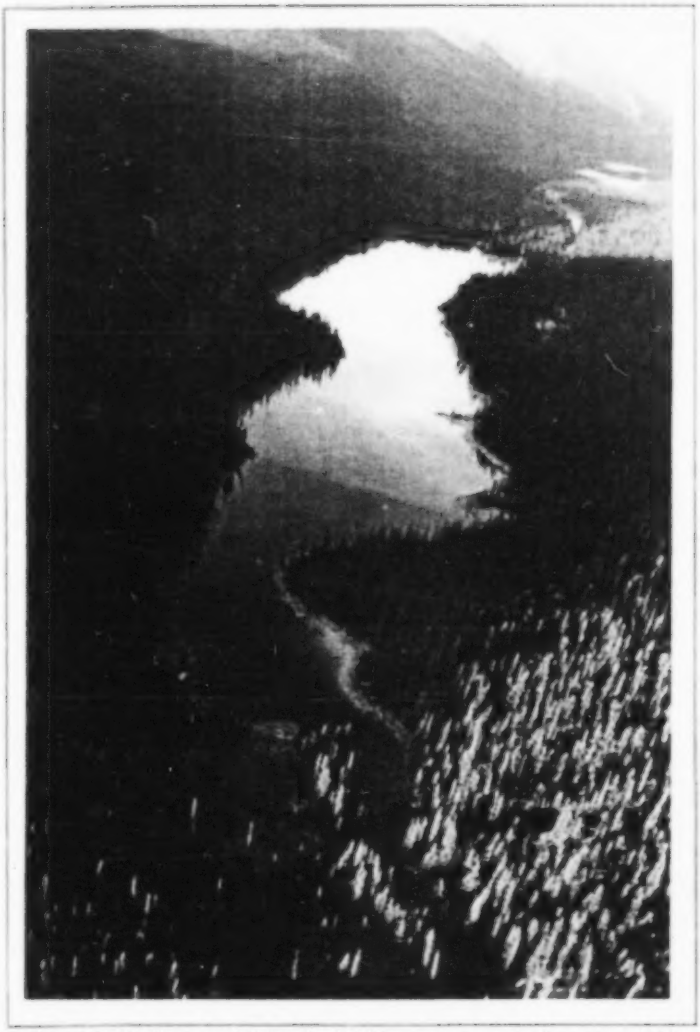


Plate # 1: Aerial view of Middle Tenakihi Lake looking southwest. Note Tenakihi Creek (outlet) in the foreground.

LAKE: Middle Tenakihi Lake

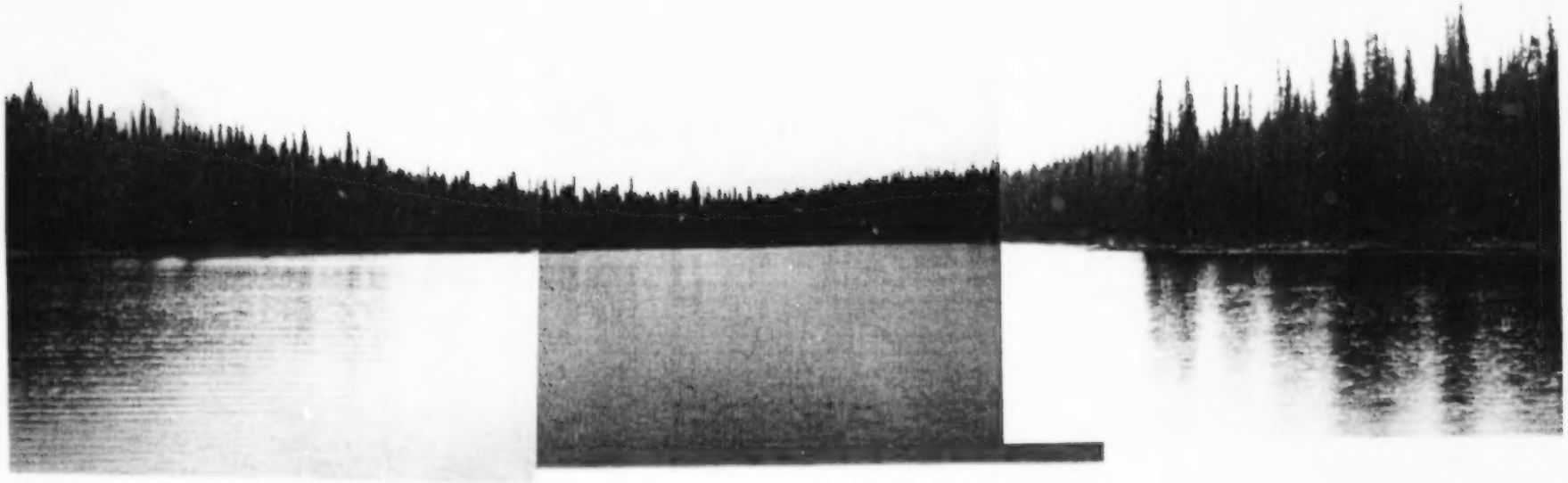


Plate # 3: Panoramic view of Middle Tenakihi Lake looking northeast from the center of the lake

LAKE: Middle Tenakihi Lake

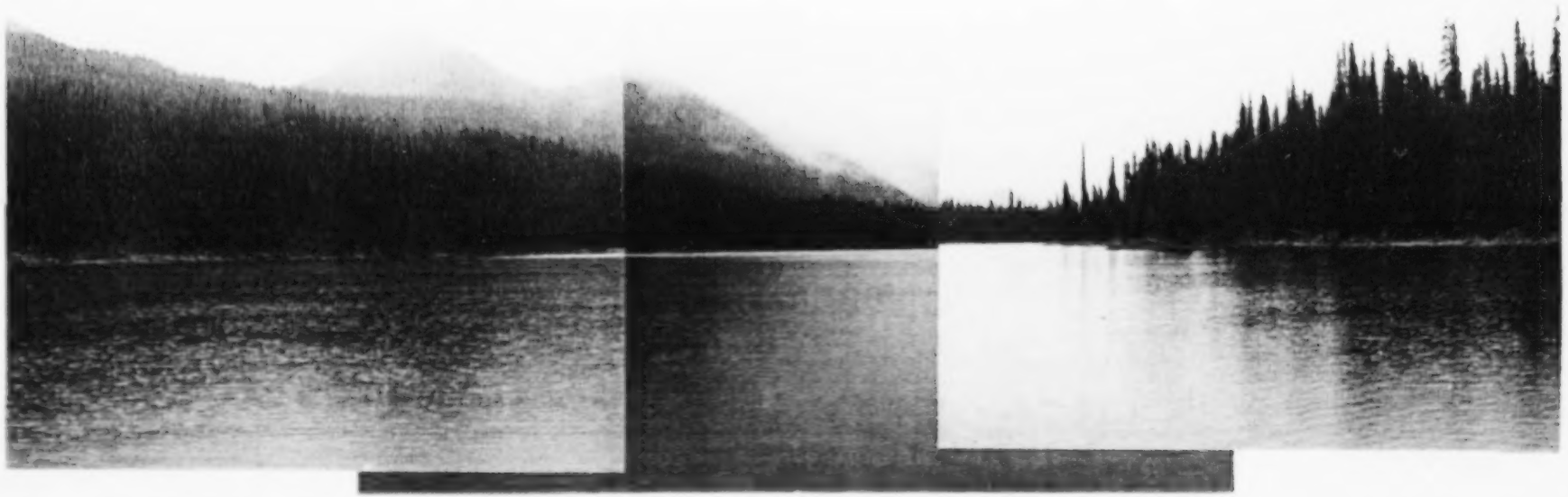


Plate # 4: Panoramic view of Middle Tenakihi Lake looking southwest from the center of the lake

LAKE: Middle Tenakihi Lake

Plate # 5: View of the benchmark located 2.0 m above present water level in a 21 cm diameter lodgepole pine tree that is 4.6 m from the present water's edge and located on the north end of the lake approximately 100 m form the outlet.

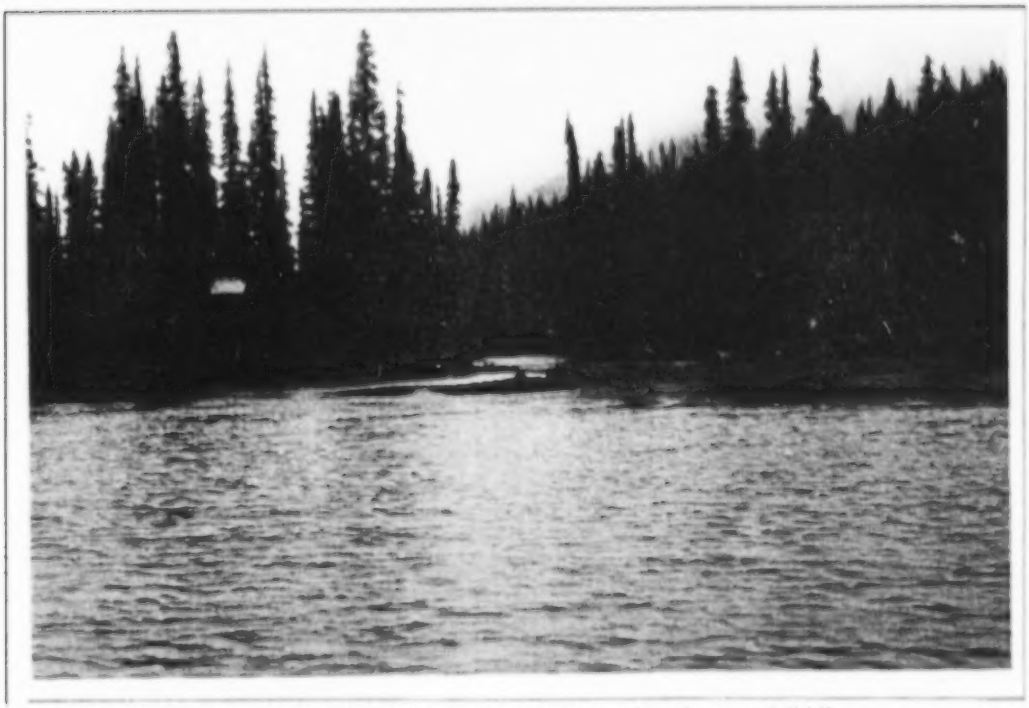


Plate # 6: View of the mouth of Tenakihi Creek (Inlet # 1) where it enters Middle Tenakihi Lake in the west corner of the lake.

LAKE: Middle Tenakihi Lake

Plate # 7: Downstream view of sample site # 1 on Tenakihi Creek (Inlet # 1), taken approximately 190 m upstream of Middle Tenakihi Lake.

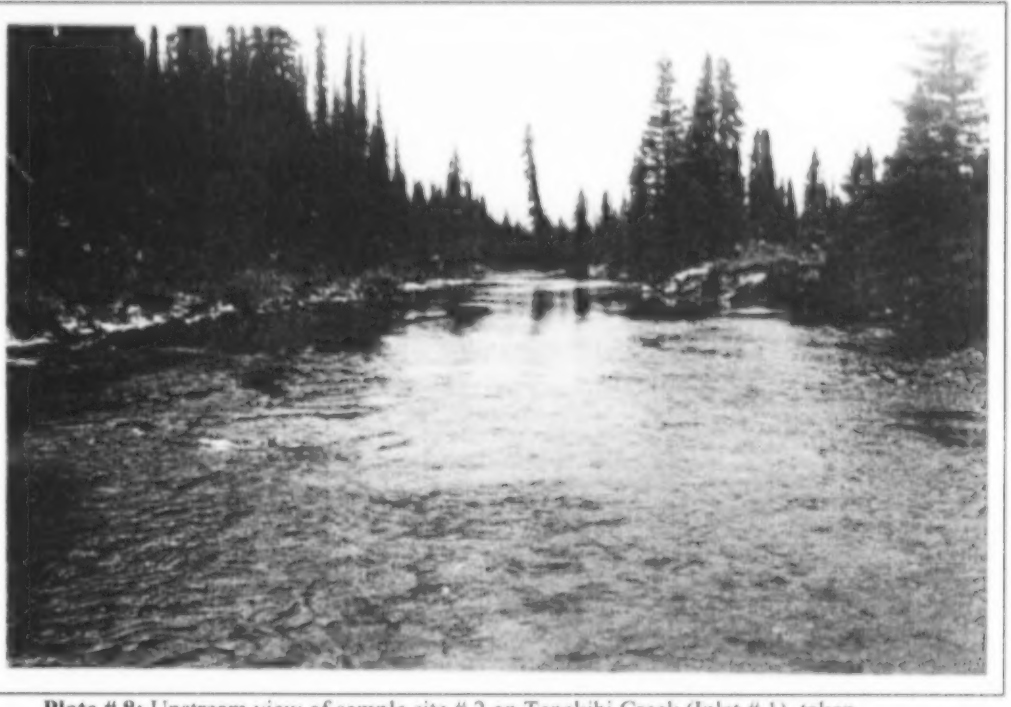


Plate # 8: Upstream view of sample site # 2 on Tenakihi Creek (Inlet # 1), taken approximately 785 m upstream of Middle Tenakihi Lake.

LAKE: Middle Tenakihi Lake

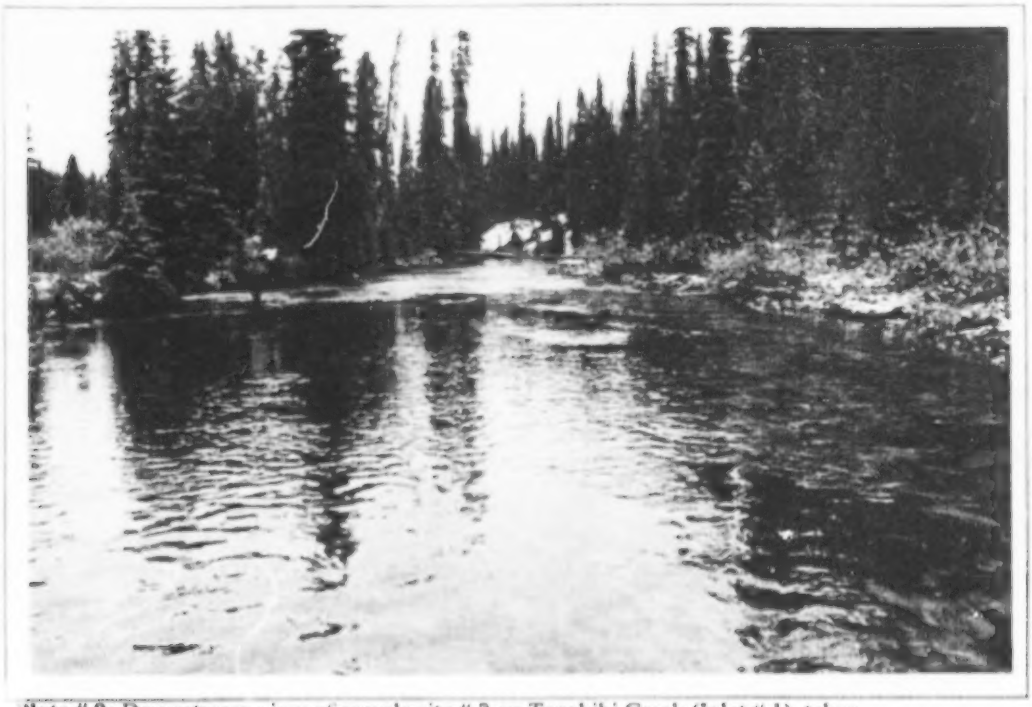


Plate # 9: Downstream view of sample site # 2 on Tenakihi Creek (Inlet # 1), taken approximately 815 m upstream of Middle Tenakihi Lake.

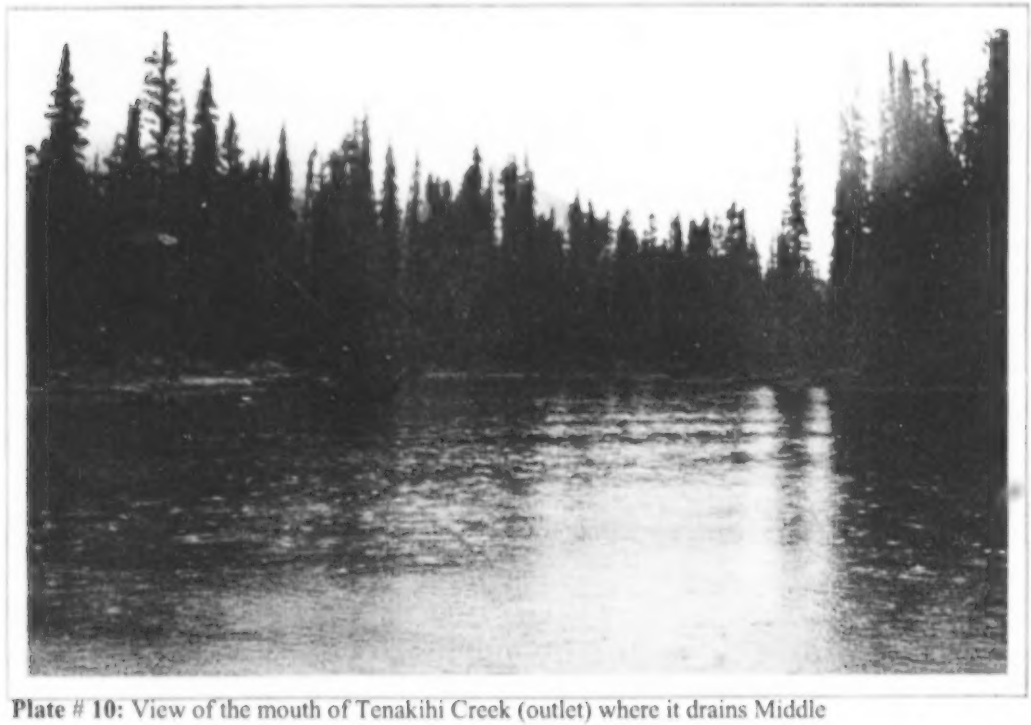


Plate # 10: View of the mouth of Tenakihi Creek (outlet) where it drains Middle Tenakihi Lake from the northeast end of the lake.

Appendix A

LABORATORY REPORT

Water Chemistry Analysis

RESULTS FOR UNNAMED LAKE-TENAKIHI LK NE SAMPLES

Parameter Analyzed		Units	965281-001	965281-002
ALKALINITY		mg/l	23.5	26.7
[illegible]DUCTIVITY		uS/cm	60	62
[illegible]ALS/TOTAL (WATER-ICP)	AG	mg/l	<.01	-
	AL	mg/l	<.06	-
	AS	mg/l	<.06	-
	B	mg/l	<.01	-
	BA	mg/l	.019	-
	BE	mg/l	<.001	-
	CA	mg/l	9.5	-
	CD	mg/l	<.006	-
	CO	mg/l	<.006	-
	CR	mg/l	.007	-
	CU	mg/l	<.006	-
	FE	mg/l	.031	-
	K	mg/l	<.1	-
	MG	mg/l	1	-
	MN	mg/l	.002	-
	MO	mg/l	<.01	-
	NA	mg/l	.5	-
	NI	mg/l	<.02	-
	P	mg/l	<.1	-
	PB	mg/l	<.06	-
	SB	mg/l	<.06	-
	SE	mg/l	<.06	-
	SI	mg/l	1.53	-
	SN	mg/l	<.06	-
	SR	mg/l	.048	-
	TI	mg/l	<.002	-
	V	mg/l	<.01	-
	ZN	mg/l	<.002	-
NITROGEN/AMMONIA		mg/l	.002	.003
/NITRITE		mg/l	<0.002	<0.002
/NITRITE+NITRATE		mg/l	.001	.001
/TOTAL		mg/l	.03	.03
PH		Rel.U.	7.56	7.56
PHOSPHORUS/O-PO4		mg/l	<.001	<.001
/TOTAL		mg/l	<.002	.002
/TOTAL DISSOLVED		mg/l	<.002	.006
RESIDUE/FILTERABLE		mg/l	60	30
/NON-FILTERABLE		mg/l	<5	<5
BC CLIENT STUDY CODE			20	20
SAMPLING AGENCY		EMScode	91	91
SITE IDENTIFIER/NUMBER			NOSITE	NOSITE
COLLECTION START DATE		y/m/d	96/09/27	96/09/27
UPPER DEPTH		metres	0.5	6.5
TEMPERATURE ON ARRIVAL		deg.C	4	4

Appendix B

Tributary Stream Data

D.F.O. / M.O.E. Stream Survey Form

DFO / MOE
STREAM SURVEY FORM

Stream Name (gaz.): Tsuyakhi Creek (local): Inlet #1 To Unnamed Lk | Access | | Method
Watershed Code: | Reach No. | Length (m)
Location: ~12 km U/S of Unnamed Lk (To Unnamed Lk (NE)) | Map # | Site No. | Enhancement: 30
UTM | Fish Card: Y (N) C | Field: X Hist.
Date Y M D: 96 08 20 | Time: 1140 | Agency | Crew: MB, KM | Photos | Air Photos

C	PARAMETER	VALUE	METH	SPECIFIC DATA
	Ave. Chan. Width (m)	19.5	ST	20.1 21.2 15.2
	Ave. Wet. Width (m)	16.9	ST	12.4 21.0 M.F
	Ave Max Riffle Depth (cm)	30	OM	24 36 33
	Ave Max Pool Depth (cm)	55	OM	63 ST 47
	Gradient %	1.5	SC	
	% Pool 5 Riffle 40 Run 5 Other 1		GE	
	Side Chan. %		GE	
	Debris: Area %		GE	
	Debris: Stable %	70	GE	
	COVER: Total %	5	GE	
	Comp. Sorm 100%	40	TO	0 0 0 30
	Crown Closure %	0	E	Aspect NNE

BED MATERIAL (%): Fines (clay, silt, sand <2mm) 10; Gravels (small 2-16mm) 15; (large 16-64mm) 40; Cobbles (64-128mm) 25; Large (128-256mm) 10; (256-512mm) 0; Bedrock (R) 0
D_{90} (cm) 13 | C | Compaction L (M) H

BANKS: C 1 | Height (m) 0.2 | % Unstable 40 | Texture (S) G L R
Containment: EN CO FC (DC) UC N/A
Valley Channel Ratio: 0-2 2-3 (3-10) 10+ N/A
Flood Stage: Dry L (M) H Flood
Fluvial Signs (m): 0.4 (Y) N
Water Temp (°C): 7 | Cond (25°C)

OBSTRUCTIONS: C | Height | Type | Location

Cover 7.0 m

DISCHARGE

Parameter	Value	Method	Specific Data
Wetted Width (m)	13.0	ST	12.6 13.3
Mean Depth (m)	0.3	OM	0.31 0.33 0.36 0.31 0.30
Mean Velocity (m/s)	0.3	FOM	
Discharge (m^3/s)	0.78	FOM	

REACH SYMBOL (Plan)
Width Value, Channel Shape | Bed Material

STREAM/VALLEY CROSS-SECTION (Looking Downstream)
L R
PLANIMETRIC VIEW

#	Species	No.	Size Range (mm)	%	Use
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					

COMMENTS

Channel Stability | Debris | Management Concerns | Obstructions | Riparian Zone | Valley Wall Processes | Fish

1 Substrate covered in small to large cobbles, some of
2 these covering a thin

Entered by
Date Y M D

DFO/MOE
STREAM SURVEY FORM

Stream Name (gaz.)	Tenakihi Cr	(local)	Tenakihi Lk Unnamed Lk			Access			Method
Watershed Code						Reach No.		Longitudinal	
Location	~ 8 km U/S of Unnamed Lk			Map #		Site No.		Link Number	30
	(Tenakihi Lk NE)			UTM		Fish/Cold	Y (N)	Field ☑	Inf at. ☐
Date Y M D	96 08 25	Time	1025	Agency		Crew	[illegible]	Photos	Air Photos

C	PARAMETER	VALUE	METH	SPECIFIC DATA
	Ave Chan. Width (m)	17.0	51	R: 15.4 F: 2
	Ave Wet Width (m)	14.1	51	13.9 14.2 14.4
	Ave Max Riffle Depth (cm)	70	51	21 53 70
	Ave Max Pool Depth (cm)	/	51	
	Gradient %	1.5	SC	
	% Pool 0 Riffle 50 Rapid 50 Cascade		GE	
	Side Chan. %	☒ ☐ ☐ ☐ ☐	GE	
	Debris Area %	☒ ☐ ☐ ☐ ☐	GE	
	Stable %		GE	
	COVER Total %	5	GE	

Comp Depth (m)	Dr Pool	LOG	Boulder	Live veg	Over veg	Cutbank
0	0					

BED MATERIAL		%
Fines	mod. pct. sand (<2 mm)	20
Gravels	small (2 - 16 mm)	25
	large (16 - 64 mm)	35
Large Rock	sm. cobble (64 - 128 mm)	10
	lge. cobble (128 - 256 mm)	5
	boulder (>256 mm)	5
Bedrock (R)		0

BANKS	
Roughness	0 3 Unstable 35
Texture	① ② L R
Continement	EN CO FC OC UC N/A
Valley Channel Ratio	0-2 2-5 5-10 10+ N/A
Channel Stage	Dry L M H Flood
Flood Signs	0 5 Braided Y N
Width (m)	15

OBSTRUCTIONS			
C	Num	Type	Loc n

Aspect [illegible]

DISCHARGE

Parameter	Value	Method	Specific Data
Wetted Width (m)	11.5	SI	6.4 11.0
Mean Depth (m)	0.2	DM	0.37 0.38 0.20 0.30 0.03
Mean Velocity (m/s)	0.4	FLM	0.83 0.86 1.0 0.5 0.2 0.6
Discharge (m³/s)	2.3	FLM	

REACH SYMBOL (Right)

Width Varies Channel Shape Bed Material

CP #18241

FISH SUMMARY

C	Species	No.	Size Range (mm)	Life Phase	Use	Method (Rec)

STREAM/VALLEY CROSS-SECTION (Looking Downstream) ☐

L R

PLANIMETRIC VIEW ☐

COMMENTS

Channel Stability _ Debris _ Management Concerns _ Obstructions _ Riparian Zone _ Valley Wall Processes _ Etc.

Lwr → has [illegible] mass. gravels not cross @ one point. Right bedrock U/S
~0.4 m bdk. mass. bedrock not cross. Some cobble
norm. side pool present. Riv must be high

Edited by

Date Y M D

DFO / MOE
STREAM SURVEY FORM

Stream Name (gaz): Tenakihi Creek (local): Outlet to Unnamed Lk | Access | | Method

Watershed Code | Reach No. | Longitude | | |

Location: ~ 120m D/S of Unnamed Lk (Tenakihi Lk (NE)) | Map # | Site No. | Latitude: 30

UTM | Fish Code: Y (N) | R

Date Y M D: 96 / 08 / 16 | Time: 1450 | Agency | Crew: MM KM | Photos | Air Photos

C	PARAMETER	VALUE	METH	SPECIFIC DATA
	Ave. Chan. Width (m)	12.0	ST	13.3 12.6 10.5
	Ave. Wet. Width (m)	9.5	ST	9.0 11.1 8.4
	Ave. Max Riffle Depth (cm)	40	OM	51 32 36
	Ave. Max Pool Depth (cm)	/	OM	
	Gradient %	3	SC	
1	% Pool: 10 Riffle: 60 Rapid: 20 Other: 20		GE	
	Side Chan. %	0 (X) 0-10 ( ) 10-40 ( ) >40 ( )	GE	
	Debris: Area % (X) 0-5 ( ) 5-10 ( ) >10 ( )		GE	
	Debris: Stable %	/	GE	
	COVER: Total %	10	GE	
	Composition 100%: Dp Pool 0; Log 0; Boulder 50; Sm. veg. C; Over veg. 35; Cutbank 15			
	Current Category %	C	E	Aspect: NW/S

BED MATERIAL (Size): Fines (clay, silt, sand) (<2mm) % 10; Gravels (small 2-16mm, large 16-64mm) 10; Larges (cobble 64-128mm, boulder 128-256mm) 20; Bedrock (R) 30; Unconsolidated 20

Dominant: FA | Consolidation: L (M) H

C	BANKS
2	Steepness: 0.2 Vegetation: 20
	Texture: (F) G C B
	Confinement: EN CO FC (OC) UC N/A
	Valley Channel Ratio: 0-2 2-5 5-10 (10+) N/A
	Stage: Dry L (M) H Flood
	Flood Signs (mm): 0.35 Braided: Y (N)
3	Bank (%): 15 (dir) (Tangent to Curve)
	Water Temp (°C): 7 Turb. (Clear) Cond. (25°C)

OBSTRUCTIONS

C	Sketch	Type	Loc m

DISCHARGE

Parameter	Value	Method	Specific Data
Wetted Width (m)	8.0	ST	7.5 8.2
Mean Depth (m)	0.2	OM	0.20 0.21 0.37 0.43 0.12
Mean Velocity (m/s)	0.3	FM	0.28 0.31 0.57 0.76 0.42 0.28
Discharge (m³/s)	0.24	F/M	

REACH SYMBOL (Fish)

Height, Valley, Channel, Slope | Geol. Material

REACH DESC. 6 | SS-87

C	Species	No.	Size Range (mm)	Use

STREAM/VALLEY CROSS-SECTION (Looking Downstream) L R

PLANIMETRIC VIEW

COMMENTS

Channel Stability _ Debris _ Management Concerns _ Obstructions _ Riparian Zone _ Valley Wall Processes _ Etc.

1 Colour is a bit [illegible]

2 Fines are mostly [illegible]

3 Fish bar [illegible]

Entered by

Date Y M D

DFO/MOE
STREAM SURVEY FORM

Stream Name (geo.)	(local)	Access		Method
Watershed Code	Reach No.	Longitude		
Location	Map #	Site No.	Latitude	
	UTM	Fish Card	Y / N	Field / Final
Date Y M D	Time	Agency	Crew	Air Photos

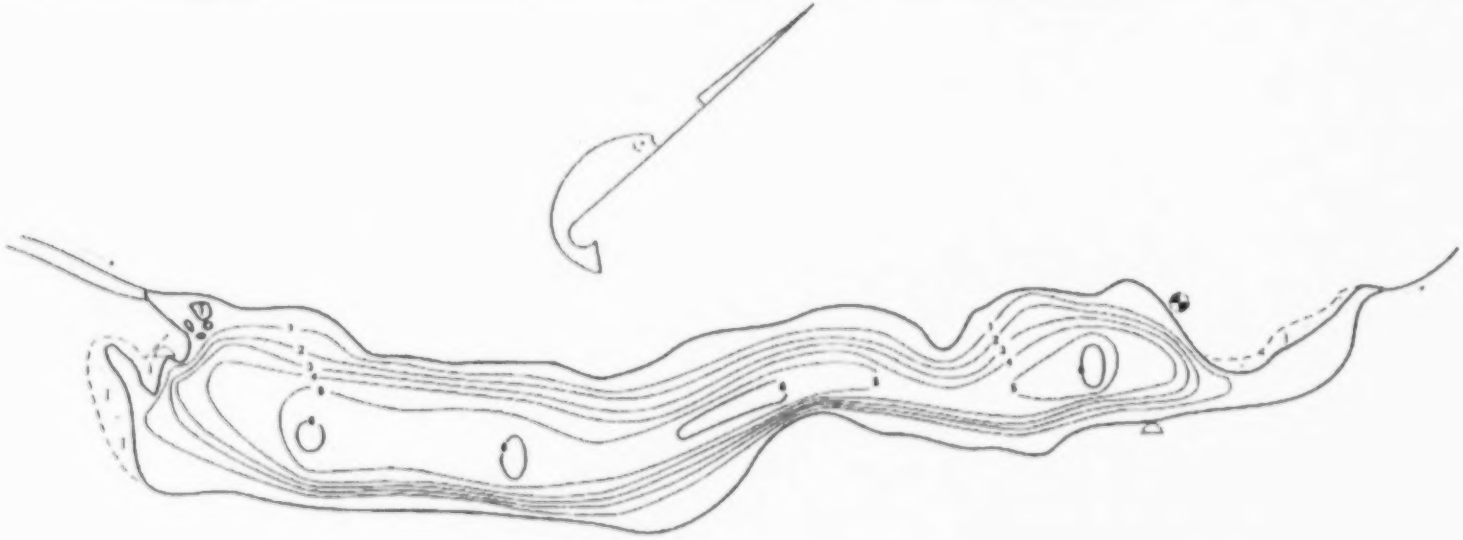
C	PARAMETER	VALUE	METH	SPECIFIC DATA	C	OBSTRUCTIONS #	Type	Loc'n
	Ave. Chan. Width (m)	4.5	T	39 3.5 3.2 3.0				
	Ave. Wet Width (m)	3.0	T	2.5 2.1 2.1 2.1				
	Ave. Max Riffle Depth (cm)	35	D/T	30 41				
	Ave. Max Pool Depth (cm)	>0	D/T	72				
	Gradient %	3	T					
	% Pool 10 Rifle 60 Rapid 30 Other		GE	BED MATERIAL (Type) %	C	BANKS		
	Slow Chan. % 0 0-5 5-10 10-40 >40		GE	Fines clay, silt, sand (<2mm) 10	1	Height (m) 0.3 Undercut 30		
	Wet Area % 0 0-5 5-10 >10		GE	Gravels small (2-16mm) 15		Texture (C) (S) (L) R		
	Debris Stable % 10		GE	Gravels large (16-64mm) 30		Confinement Bk CO FC OC VC N/A		
	COVER Total % 30		T	Large sm cobble (64-128mm) 30		Valley Channel Ratio 0-2 2-5 5-10 >10 N/A		
	Comp sum 100% Bo Pool / LOD / Boulder / Bo rap / Over veg / Conifer			Large Pge cobble (128-256mm) 15		Stage Dry L M H Flood		
				Boulder (>256mm) 0		Flood Signs (m/m) 0.4 Graded Y / N		
	Undercut Closure % 10 C Aspect			Bedrock (R) 10		Bars (%) 15 (m) Oblique		
				Debris (cm) 15 C Comments: L M H		Water Temp (°C) 15 Turbidity: Cond. (µS/cm)		

DISCHARGE

Parameter	Value	Method	Specific Data
Wetted Width (m)	2.5	ST	2.7 2.3
Mean Depth (m)	0.1	F-Pm	0.2 0.1 0.1 0.16 0.2 0.2 0.2

Appendix C

BATHYMETRIC MAP



Reduced to
34%
of Original Size

STATISTICS AT TIME OF SURVEY		
Elevation	1700	m.
Surface Area	163291	sq.m
Area above ice contour	157300	sq.m
Volume	371669	cu.m
Mean Depth	2.4	m
Maximum Depth	7.1	m
Perimeter, Main Shore	1360	m
Perimeter, Islands	30	m
Bench Mark	7.0	m

BY Jennifer Pojkar
B.C. Conservation Foundation

Middle Tenakihi Lake